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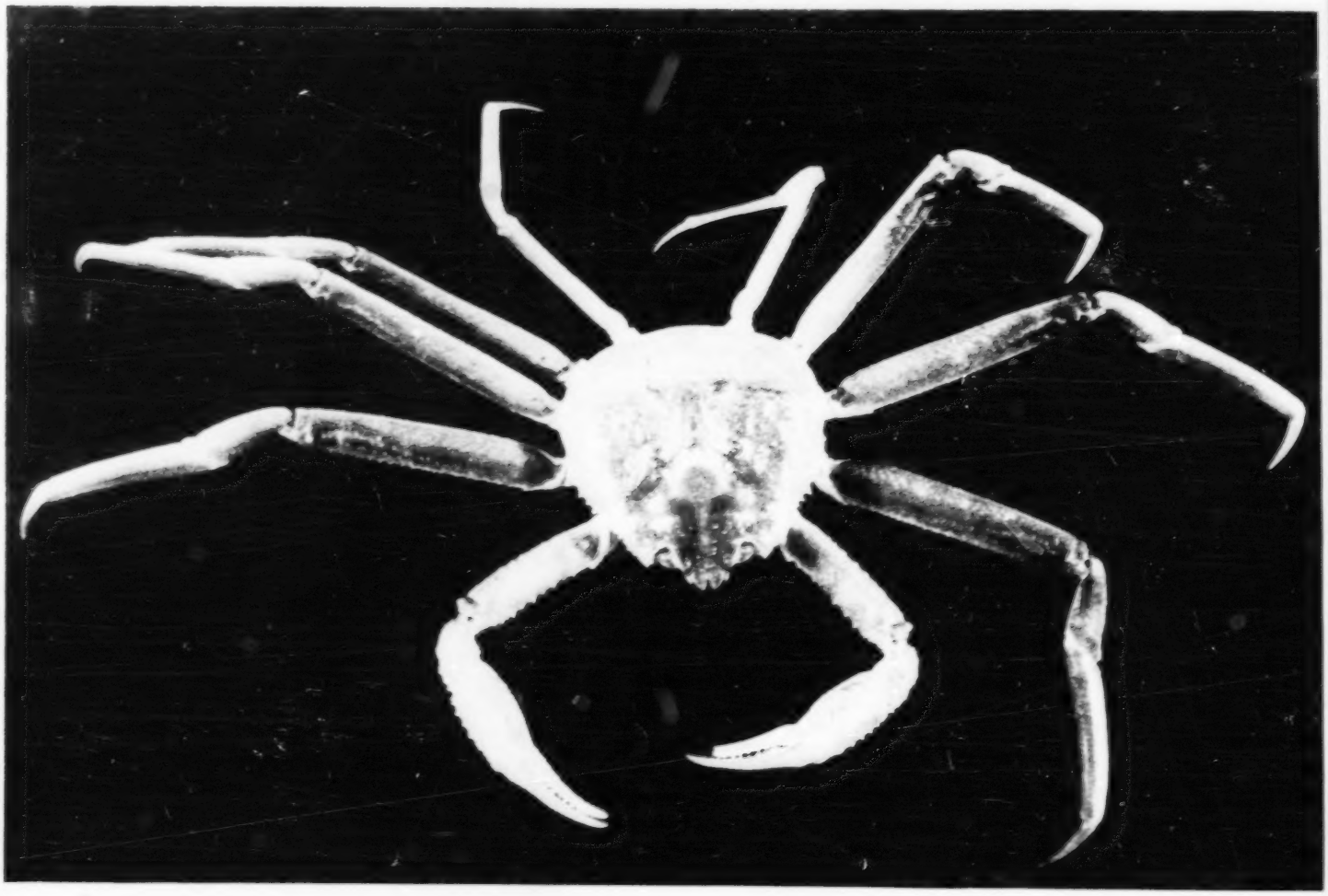
PROJECT SUMMARY

ATLANTIC FISHERIES DEVELOPMENT

Newfoundland Region
No. 21, November 1990

SOFT SHELL CRAB ASSESSMENT



Fisheries and Oceans Pêches et Océans

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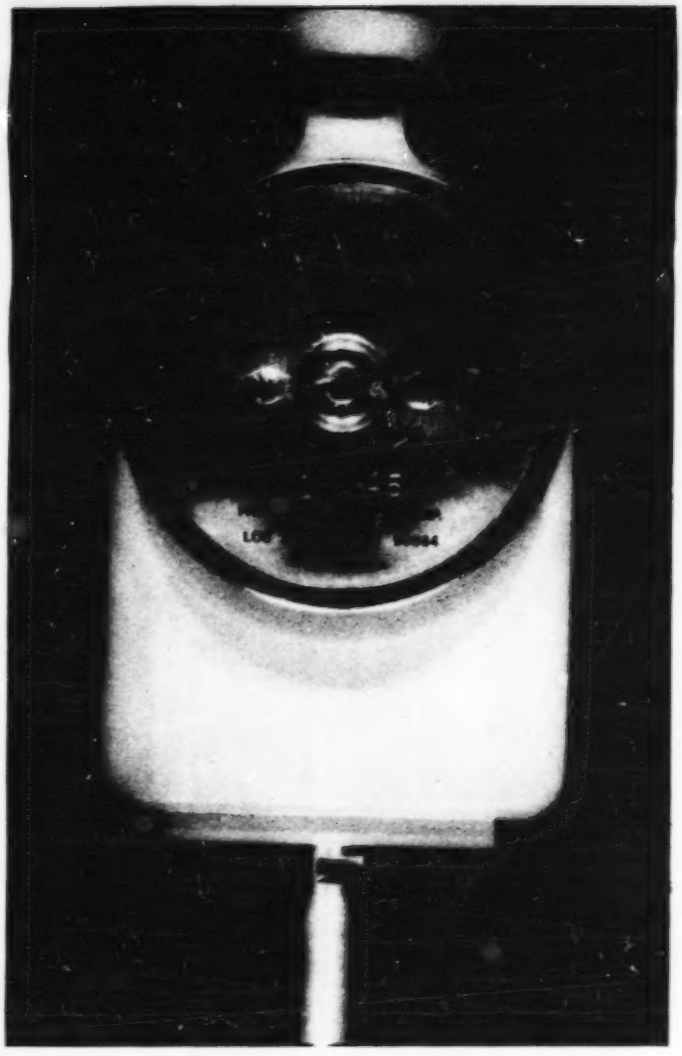

Figure 1. The Pacific Transducer Corporation Durometer used in this analysis.

INTRODUCTION

The capture and retention of soft shelled snow crab results in: (a) low meat yields; (b) reduced profits, and (c) higher landing mortality. This, in turn wastes a valuable resource. Thus a rapid reliable method of determining soft shelled crab at sea, without damaging the stock is required. Such a method would allow soft shelled crab to be returned undamaged to the ocean. In addition,the Department of Fisheries and Oceans (DFO) would be able to assess the incidence of soft shelled crab within a given area and to take appropriate action (eg. closure) thus avoiding unnecessary damage to the stock.

The softness of a crab shell may be subjectively (unscientifically) determined by applying thumb pressure to the underside of the claw. The accuracy of the thumb test depends upon the person conducting it and the results may therefore vary in consistency.

Recently, a rapid and reliable method of assessing snow crab shell hardness has been reported (Foyle et. al, 1989). This new method has now been thoroughly investigated by the Department of Fisheries and Oceans. The results of this investigation are presented and discussed in this report.

PROCEDURE

A durometer (Model 307LCRB, Pacific Transducer Corp., Los Angeles, California) was recommended by Foyle et. al, (1989) as a shell hardness gauge for the snow crab fishery. These gauges (Fig. 1) were supplied to a number of Fishery Officers experienced in assessing the softness of a snow crab shell using the thumb test. Each officer was instructed in the use of a durometer.

In pairs, the Fishery Officers, at different commercial crab processing plants, evaluated several tote boxes of snow crab. One officer evaluated the underside of one claw using the thumb test, while the other evaluated the underside of the other claw using the gauge (Fig. 2). Although the evaluations were conducted independently, care was taken to keep track of the results, so that any particular crab could be compared. Fishery Officers using the durometer were aware that results could be influenced by: (1) new hard shell; (2) graveyard crab; (3) damaged claws; (4) using the gauge too many times on one claw; and (5) pushing the gauge too quickly. The durometer was evaluated by seven different pairs of officers on a total of 1,113 snow crab.

A graph of meter readings versus the number of observations (Fig. 3) and bar graphs concerning percentage frequencies of results when evaluating the hardness gauge (durometer) and the thumb test (Fig. 4 and 5) were plotted.

RESULTS AND DISCUSSION

The graph of meter readings versus the number of observations (Fig. 3) indicates the distribution of gauge readings was continuous. There was not a distribution of readings for hard shelled crab and another distribution of readings for soft shelled crab. Therefore, any reading that would be selected to differentiate hard shelled crab from soft shelled crab would be arbitrary.

A gauge reading of 68 was observed to be the reading that best matched the result of the thumb test. On a batch basis of the 1,113 snow crab, 75% had a gauge reading of at least 68 indicating hard

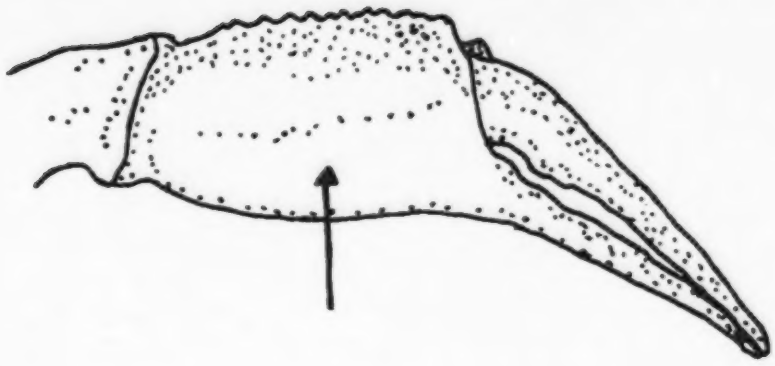

Figure 2. Location where Durometer and thumb test evaluations were applied.

shelled and 25% had a gauge reading of less than 68 indicating soft shelled (Fig. 4). This is similar to the results of the thumb test which indicated that 73.3% were hard shelled and 26.7% were soft shelled (Fig. 4).

The 1,113 snow crab were also evaluated on an individual basis. Again, the results of the thumb test indicated 73.3% of the crab were hard shelled and 26.7% of the crab were soft shelled (Fig.5, Table 1). The results of the gauge test indicated 69.2% of the crab were hard shelled; another 5.8% were hard shelled when assessed using the gauges, but soft shelled when assessed using the thumb test. Almost twenty-one percent (20.9%) were soft shelled and another 4.11% were soft shelled when assessed using the gauge but were hard shelled when using the thumb test (Fig. 5, Table 1). Although these results were not as accurate as when the gauge was evaluated on a batch basis, the results of individual tests were still satisfactory (Fig. 5, Table 1). Less than 10% of the 1,113 evaluations were incorrect when compared to the thumb test.

The gauge itself is 12.5 cm long x 5.7 cm wide x 3.6 cm deep. At the end of the gauge there is a shaft which has a 3.2 mm diameter probe that is 2 mm long (Fig. 4). The gauge weighs only 247.9 g (approximately 1/2 lb.) and costs approximately $350. It appears to be very appropriate for use at sea. It is accepted that fishermen can often determine whether snow crab are soft shelled without touching them. However, if there is any doubt, the gauge can be used to rapidly make a determination. Regardless of who uses the gauge or where it is used (at sea or on land) and assuming the gauge is properly used, the results should be consistent. This is not true of the thumb test as results vary with the person conducting the test. In addition, because the diameter of the probe is so small, the gauge does far less damage to the crab than the thumb test. This is extremely important if the soft shelled crab are to be returned to the ocean and are to recover to the hard shelled condition.

In conclusion, the use of durometers as gauges to rapidly but objectively determine whether snow crab are hard shelled or soft shelled is strongly recommended.

ACKNOWLEDGEMENTS

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REFERENCES

Foyle, T.P., G.V. Hurley, and D.M. Taylor. 1989. Field Testing Shell Hardness Gauges for the Snow Crab Fishery. Canadian Industry Report of Fisheries and Aquatic Sciences. No. 193, 38 p.

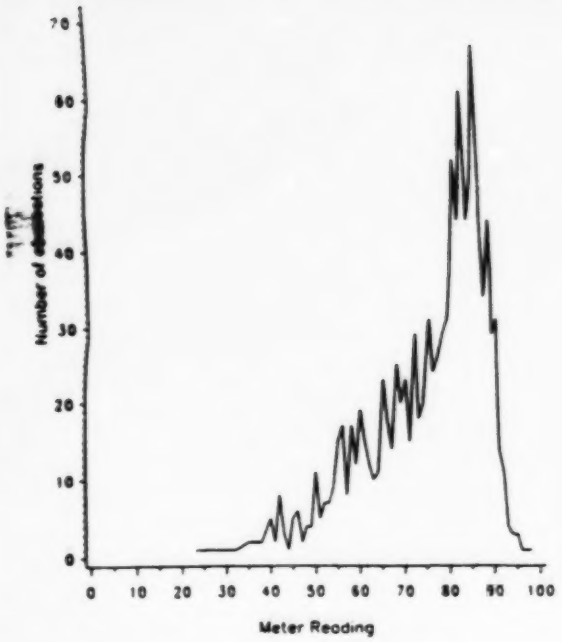

Fig. 3 A graph of the 1,113 durometer readings versus the number of observations.

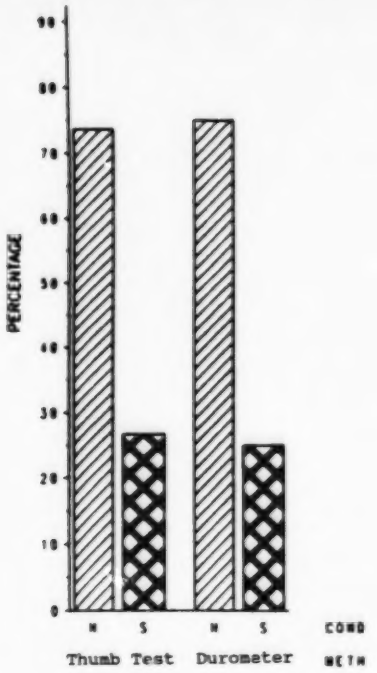

Fig. 4 Percentage frequencies of the durometer and the thumb test, determined on a batch basis. S=soft shell; H=hard shell; Cond. = condition; Meth. = method.

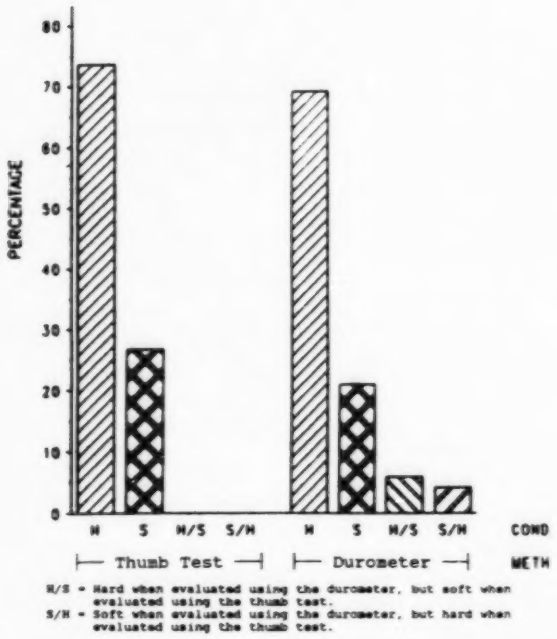

Fig. 5 Percentage frequencies of the durometer and the thumb test, determined on an individual crab basis. S =soft shell; H = hard shell; Cond. = condition; Meth. = method.

Table 1. OVERALL RESULTS OF SEVEN GROUPS OF FISHERY OFFICERS USING THE THUMB TEST AND A DUROMETER WITH A READING OF 68 USED TO DIFFERENTIATE A TOTAL OF 1,113 SNOW CRAB.

	OVERALL FREQUENCIES (%)
METER READING OF 68	
HARD SHELLED SNOWCRAB	69.2
SOFT SHELLED SNOWCRAB	20.9
METER INDICATED SOFT SHELLED BUT THUMB TEST INDICATED HARD SHELLED	4.1
METER INDICATED HARD SHELLED BUT THUMB TEST INDICATED SOFT SHELLED	5.8
THUMB TEST	
HARD SHELLED	73.3
SOFT SHELLED	26.7

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